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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,716	08/28/2001	Kazushige Yonenaga	011070	2708

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ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP	LEUNG, WAI LUN

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2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/939,716	YONENAGA ET AL.
	Examiner	Art Unit
	Danny Wai Lun Leung	2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _21 September 2006_.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-23_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) _19 and 23_ is/are allowed.

6)☒ Claim(s) _1-18 and 20-22_ is/are rejected.

7)☐ Claim(s) _3_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _8/28/2001_ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Allowability withdrawn

1.   The indicated allowability of claims 10-12, 17, 18, and 20-22 is withdrawn after further review of the reference(s) to Yonenaga et al. *(US005543952A)* and Burns et al. *(US005644664A)*. Rejections based on the new citations follow.

Drawings

2.   The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, "the optical transmitter comprising: ... wherein said bandwidth restriction means locates between an output of said amplifier and an input of said electrical-optical conversion means, wherein said electrical-optical conversion means has a traveling wave type electrode designed so that phase change of optical wave propagating in optical waveguide depending upon electrical field has waveforms of a ternary duobinary signal" as described in claims 1, 10, 13, 16-18 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Particularly, fig 7, directed to <u>the fourth embodiment</u> of the current invention, demonstrates a bandwidth restriction means locates between an output of said amplifier and an input of said electrical-optical conversion means. However, <u>fig 7 does not expressly illustrate</u> that the electrical-optical conversion means in this embodiment has a traveling wave type electrode designed so that phase change of optical wave propagating in optical waveguide depending upon electrical field has waveforms of a ternary duobinary signal.

Fig 14, directed to the eighth embodiment of the current invention, demonstrates an

electrical-optical conversion means in this embodiment has a traveling wave type

electrode; while the section of the original specification on page 24-25 describes that the

electrical-optical conversion means in this embodiment has a traveling wave type

electrode designed so that phase change of optical wave propagating in optical waveguide

depending upon electrical field has waveforms of a ternary duobinary signal. However,

there is no "bandwidth restriction means locates between an output of said amplifier and

an input of said electrical-optical conversion means" in this embodiment.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to

the Office action to avoid abandonment of the application. Any amended replacement drawing

sheet should include all of the figures appearing on the immediate prior version of the sheet,

even if only one figure is being amended. The figure or figure number of an amended drawing

should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure

must be removed from the replacement sheet, and where necessary, the remaining figures must

be renumbered and appropriate changes made to the brief description of the several views of the

drawings for consistency. Additional replacement sheets may be necessary to show the

renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The

objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4.   Claims 1-6, 8/6/5/1, 9/6/5/1, 10, 13, 14/9/6/5/1, 15/9/6/5/1, and 16-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not expressly describe a particular embodiment in which "the optical transmitter comprising: … wherein said bandwidth restriction means locates between an output of said amplifier and an input of said electrical-optical conversion means, wherein said electrical-optical conversion means has a traveling wave type electrode designed so that phase change of optical wave propagating in optical waveguide depending upon electrical field has waveforms of a ternary duobinary signal"

Claim Rejections - 35 USC § 103

5.   The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6.   Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Number 5,543,952 to **Yonenaga** et al.

Regarding to claim 1, Yonenaga discloses an optical transmitter (fig 1b) comprising:

an input terminal (col 3, ln 34) for accepting an electrical binary signal (col 3, ln 35),

bandwidth restriction means for restricting bandwidth of said electrical binary signal (col 4, ln 14-16),

an electrical-optical conversion means for converting said electrical signal which is bandwidth restricted by said bandwidth restriction means to an optical signal (col 3, ln 37-45).

Yonenaga further teaches wherein said electrical-optical conversion means has a traveling wave type electrode *(70, fig 1B)* designed so that phase change of optical wave propagating in optical waveguide depending upon electrical field has waveforms of a ternary duobinary signal *(fig 12F)*.

Yonenaga does not disclose expressly having an amplifier for amplifying an input signal of said electrical-optical conversion means so that said input signal has enough level for operating said electrical-optical conversion means, and wherein said bandwidth restriction means locates between an output of said amplifier and an input of said electrical-optical conversion means.

However, Examiner takes official notice that it is common and well known to place an amplifier along a transmission medium in order to restore signal strength. As it is well recognized that signals degrade as they travel through a transmission medium, it would have been obvious to put amplifiers along any points of a transmission system or medium, such as at the input of **Yonenaga's** electrical-optical conversion means or bandwidth restriction means, in order to restore signal strength, so that **Yonenaga's** input signal has enough level for operating said electrical-optical conversion means.

Regarding to claim 2, Yonenaga discloses an optical transmitter wherein a precoding means (80, fig 1B) is provided at an input stage, said precoding means provides a binary output

which is the same as the previous output when an input binary digital signal is 0, and an output

which differs from the previous output when an input digital signal is 1 (col 5, ln 59-65), and

said bandwidth restriction means is a low- pass filter which generates a ternary duobinary signal

(75b, fig 1B; col 6, ln 50-54).

Regarding to claim 3, Yonenaga discloses an optical transmitter wherein said electrical-

optical conversion means provides the maximum level of optical output for an input electrical

signal having the maximum level and the minimum level (col 9, ln 23-32), the minimum level of

optical output for an input electrical signal having middle level between said maximum level and

said minimum level (col 9, ln 23-32), and optical phase of said maximum level of said optical

signal is opposite of optical phase of said minimum level of said optical signal (col 9, ln 29).

Regarding to claim 4, Yonenaga discloses an optical transmitter wherein said electrical-

optical conversion means is a Mach Zehnder light intensity modulator having a pair of electrodes

which are driven by ternary electrical duobinary signals having opposite polarities (col 8, ln 32-

39).

Regarding to claim 5, Yonenaga discloses an optical transmitter wherein at least two of

said bandwidth restriction means, and said electrical-optical conversion means are integrated in a

single module (fig 1B, where everything is in one module). Since it is common and well known

to place amplifiers anywhere along a communication link in order to restore signal strength, it

would have been obvious to incorporate such amplifier in the module as well, so that such

integrated single module has enough signal strength to operate properly.

7.   Claims 6-7, 9, 14, 15, 17, 18, 20, and 21 are rejected under 35 U.S.C. 103(a) as being

unpatentable over US Patent Number 5,543,952 to Yonenaga et al, as applied to claims 1 and 5

above, in view of US Patent Number 5,644,664 to Burns et al.

Regarding to claim 6, Yonenaga discloses an optical transmitter in accordance to claim 5

contains electrical-optical conversion means, but does not disclose expressly that the electrical-

optical conversion means has function as bandwidth restriction means. Burns, from the same

field of endeavor, discloses an optical transmitter contains electrical-optical conversion means

that has function as the bandwidth restriction means (col 9, ln 38-39). Therefore, it would have

been obvious to a person of ordinary skill in the art at the time of invention to incorporate Burns'

electrical-optical conversion means that has function as bandwidth restriction means with

Yonenaga's optical transmitter in order to restrict bandwidth by using the electrical-optical

conversion means without additional filtering components in the system such that the size and

cost of the transmitter could be lowered.

Regarding to claim 7, Yonenaga discloses an optical transmitter (fig 1B) comprising:

an input terminal (col 3, ln 34) for accepting an electrical binary signal (col 3, ln 35),

an electrical-optical conversion means (col 3, ln 37-45) for converting an electrical signal

to an optical signal.

Yonenaga further teaches wherein said electrical-optical conversion means has a

traveling wave type electrode *(70, fig 1B)* designed so that phase change of optical wave

propagating in optical waveguide depending upon electrical field has waveforms of a ternary

duobinary signal *(fig 12F)*.

Yonenaga does not disclose expressly having an amplifier for amplifying an input signal

applied to the input terminal to level requested for operating an electrical-optical conversion

means, and applying the amplified electrical signal to the electrical-optical conversion means.

However, Examiner takes official notice that it is common and well known to place an amplifier

along a transmission medium in order to restore signal strength. As it is well recognized that

signals degrade as they travel through a transmission medium, it would have been obvious to put

amplifiers along any points of a transmission system or medium, such at the input terminal of

Yonenaga's system to amplify an input signal, in order to restore signal strength so that

Yonenaga's input signal has enough level for operating said electrical-optical conversion means.

Yonenaga does not disclose expressly that the electrical-optical conversion means have a

traveling wave type electrode operating to restrict bandwidth of an output light of the electrical-

optical conversion means.

Burns, from the same field of endeavor, discloses an electrical-optical conversion means

having a traveling wave type electrode operating to restrict bandwidth of an output light of an

electrical-optical conversion means (col 4, ln 16-33). Therefore, it would have been obvious to a

person of ordinary skill in the art at the time of invention to incorporate Burns' electrical-optical

conversion means with Yonenaga's optical transmitter in order to restrict bandwidth by using the

electrical-optical conversion means without additional filtering components in the system such

that the size and cost of the transmitter could be lowered.

Regarding to claim 9, the combination of Yonenaga and Burns teaches an optical

transmitter according to claim 6 or claim 7 as discussed above. Yonenaga further teaches that

the electrical-optical conversion means is a Mach Zehnder light intensity modulator having a

traveling wave type electrode (col 8, ln 31-39). Burns further teaches that the bandwidth of

optical output of the mach Zehnder light intensity modulator is restricted by using mismatching

of phase velocity of electric wave (col 9, ln 38-39) propagating the traveling wave type electrode

and optical wave propagating in an optical waveguide having refractive index depending upon

electrical field generated by the electric wave (col 12, ln 16-27).

Regarding to claim 14, Burns further teaches an optical transmitter in accordance to claim

9, wherein said Mach Zehnder Light intensity modulator is provided on a substrate of Z-cut

Lithium-Niobate (col 11, ln 7).

Regarding to claim 15, Burns further teaches an optical transmitter in accordance to claim

9, wherein said Mach Zehnder light intensity modulator is provided on a substrate of X-cut

Lithium-Niobate (col 11, ln 7).

Claims 17 and 20 are rejected for the same reasons as stated above regarding claim 9,

because in addition to the limitations in claim 9, **Burns** further teaches wherein modulation

efficiency of said Mach Zehnder light intensity modulator at lower frequency is always larger

than that at frequency higher frequency *(col 13, ln 34-52)*. **Burns** does not expressly teaches that

the lower frequency is f0/2 and that the higher frequency is higher than that of f0/2, where f0 is

clock frequency of said electrical binary signal. However, it is common and well known to a

person of ordinary skill in the art that the lowest possible sampling frequency without any data

loss is at f0/2, where f0 is a clock frequency. Therefore, it would have been obvious to recognize

that **Burns'** modulation efficiency of said Mach Zehnder light intensity modulator at f0/2 is

always larger than that at frequency higher than f0/2, Where f0 is clock frequency of said

electrical binary signal in the combination of **Yonenaga and Burns**. The motivation would have

been to achieve the most efficiency by using the lowest possible frequency at f0/2 according to a

common and well known theory such as Nyquist's criteria.

Claims 18 and 21 are rejected for the same reasons as stated above regarding claim 9,

because in addition to the limitations in claim 9, **Yonenagas** further teaches a precoding means

(80, fig 1B) provides an output which is the same as the previous output when an input binary

digital signal is 0, and an output which differs from the previous output when an input digital

signal is 1 *(fig 10, Data signal as input, precoded signal is the output)*, and said traveling wave

type electrode is designed so that phase change of optical wave propagating in said optical

waveguide depending upon said electrical field has waveforms of a ternary duobinary signal *(fig

12F)*.

Although **Yonenagas** does not expressly teaches providing said precoding means at an

input stage of an amplifier, Examiner takes official notice that it is common and well known to

place an amplifier along a transmission medium in order to restore signal strength. As it is well

recognized that signals degrade as they travel through a transmission medium, it would have

been obvious to put amplifiers along any points of a transmission system or medium, such as to

the output of **Yonenagas'** precoding means, such that said precoding means is provided at an

input stage of an amplifier, to ensure that the signal strength of the precoded signal is strong

enough to carry the necessary precoded information.

It would have been obvious to combine **Yonenaga and Burns** for the same reason as

stated above regarding claim 9.

8.   Claims 8, 10-12, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over

US Patent Number 5,543,952 to Yonenaga et al, in view of US Patent Number 5,644,664 to

Burns et al., as applied to claims 1 and 7 above, and further in view of "Modeling and

Optimization of Traveling-Wave LiNbO$_3$ Interferometric Modulators" by Chung et al, IEEE

Journal of Quantum Electronics, Vol 27, No 3, March 1991.

Regarding to claim 8, the combination of Yonenaga and Burns discloses the optical

transmitter in accordance to claims 1 and 7 as discussed above. It does not disclose expressly

wherein the bandwidth of optical output of said Mach Zehnder light intensity modulator is

restricted by using loss of said traveling wave type electrode. Chang, from the same field of

endeavor, teaches an electrical-optical conversion means is a Mach Zehnder Light intensity

modulator having a traveling wave type electrode *(page 612, section III)*, and bandwidth of

optical output of said Mach Zehnder light intensity modulator is restricted by using loss of said

traveling wave type electrode *(page 613, sections A describes relationships between loss of*

traveling wave type electrode and its bandwidth; section B describes its parameters being used

to drive the modulator). Therefore, it would have been obvious for a person of ordinary skill in

the art at the time of invention to implement Chang's technique to restrict bandwidth of optical

output of said Mach Zehnder light intensity modulator by using loss of said traveling wave type

electrode onto the combination of Yonenaga and Burns' system as taught by Chang. The

motivation for doing so would have been to be able to simplify optimization procedures by

determining the set of parameters that will satisfy the given bandwidth requirement to restrict

bandwidth of optical output of said Mach Zehnder light intensity modulator by using loss of said

traveling wave type electrode *(Chang, page 616, section V)*.

Claims 10 and 22 are rejected for the same reasons as stated above regarding claim 8, because in addition to the limitations in claim 8, **Yonenaga** further teaches a precoding means *(80, fig 1B)* provides an output which is the same as the previous output when an input binary digital signal is 0, and an output which differs from the previous output when an input digital signal is 1 *(fig 10, Data signal as input, precoded signal is the output)*, and said traveling wave type electrode is designed so that phase change of optical wave propagating in said optical waveguide depending upon said electrical field has waveforms of a ternary duobinary signal *(fig 12F)*.

Although **Yonenagas** does not expressly teaches providing said precoding means at an input stage of an amplifier, Examiner takes official notice that it is common and well known to place an amplifier along a transmission medium in order to restore signal strength. As it is well recognized that signals degrade as they travel through a transmission medium, it would have been obvious to put amplifiers along any points of a transmission system or medium, such as to the output of **Yonenagas'** precoding means, such that said precoding means is provided at an input stage of an amplifier, to ensure that the signal strength of the precoded signal is strong enough to carry the necessary precoded information.

It would have been obvious to combine **Yonenaga, Burns,** and **Chung** for the same reason as stated above regarding claims 1, 7, and 8.

As to claim 11, **Yonenaga** further teaches wherein said electrical-optical conversion means provides the maximum level of optical output for an input electrical signal having the maximum level and the minimum level *(first electrical input "0" and 3rd electrical input "2" as shown in fig 12D, result in a maximum level of optical output "intensity 1" as shown in fig 12F)*,

the minimum level of optical output for an input electrical signal having middle level between

said maximum level and said minimum level *(2nd electrical input "1" as shown in fig 12D, result*

in a minimum level of optical output "intensity 0" as shown in fig 12F), and optical phase

relating to said maximum level of said optical signal is opposite of optical phase relating to said

minimum level of said optical signal *(fig 12F shows "π" and "0" as the respective phase, which*

are opposite).

As to claim 12, **Yonenaga** further teaches wherein said electrical-optical conversion

means is a Mach Zehnder Light intensity modulator *(70, fig 1B)* having a pair of electrodes *(74a*

& b, fig 1B), and electrical signals applied to each electrodes are binary signals having opposite

polarities with each other *(note that inverter 11, fig 1B makes the electrical signals having*

opposite polarities with each other, these signals are also illustrated in fig 12A & 12B). **Chung**

further teaches each of the electrodes in a Mach Zehnder Light intensity modulator is a traveling

wave type electrode having bandwidth restriction property *(page 613, sections A describes*

relationships between loss of traveling wave type electrode and its bandwidth; section B

describes its parameters being used to drive the modulator).

9.   Claim 8, 10, 11, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over

US Patent Number 5,543,952 to Yonenaga et al, in view of US Patent Number 5,644,664 to

Burns et al., as applied to claims 1 and 7 above, and further in view of applicant's admission on

page 14-16 of in reply filed 5/8/2006.

Regarding to claim 8, the combination of Yonenaga and Burns discloses the optical

transmitter in accordance to claims 1 and 7 as discussed above. It does not disclose expressly

wherein said bandwidth of optical output of said Mach Zehnder light intensity modulator is restricted by using loss of said traveling wave type electrode. However, applicant admitted that it is common and well known to use an electrical-optical conversion means such as a Mach Zehnder Light intensity modulator having a traveling wave type electrode to restrict bandwidth of optical output of said Mach Zehnder light intensity modulator by using loss of said traveling wave type electrode. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to restrict bandwidth of optical output of said Mach Zehnder light intensity modulator by using loss of said traveling wave type electrode onto the combination of Yonenaga and Burns' system as taught by applicant's admission. The motivation for doing so would have been to be able to simplify optimization procedures by determining the set of parameters that will satisfy the given bandwidth requirement to restrict bandwidth of optical output of said Mach Zehnder light intensity modulator by using loss of said traveling wave type electrode.

Claims 10 and 22 are rejected for the same reasons as stated above regarding claim 8, because in addition to the limitations in claim 8, **Yonenaga** further teaches a precoding means *(80, fig 1B)* provides an output which is the same as the previous output when an input binary digital signal is 0, and an output which differs from the previous output when an input digital signal is 1 *(fig 10, Data signal as input, precoded signal is the output)*, and said traveling wave type electrode is designed so that phase change of optical wave propagating in said optical waveguide depending upon said electrical field has waveforms of a ternary duobinary signal *(fig 12F)*.

Although **Yonenagas** does not expressly teaches providing said precoding means at an

input stage of an amplifier, Examiner takes official notice that it is common and well known to

place an amplifier along a transmission medium in order to restore signal strength. As it is well

recognized that signals degrade as they travel through a transmission medium, it would have

been obvious to put amplifiers along any points of a transmission system or medium, such as to

the output of **Yonenagas'** precoding means, such that said precoding means is provided at an

input stage of an amplifier, to ensure that the signal strength of the precoded signal is strong

enough to carry the necessary precoded information.

It would have been obvious to combine **Yonenaga, Burns,** and **Applicant's admission**

for the same reason as stated above regarding claims 1, 7, and 8.

As to claim 11, **Yonenaga** further teaches wherein said electrical-optical conversion

means provides the maximum level of optical output for an input electrical signal having the

maximum level and the minimum level *(first electrical input "0" and 3rd electrical input "2" as*

shown in fig 12D, result in a maximum level of optical output "intensity 1" as shown in fig 12F),

the minimum level of optical output for an input electrical signal having middle level between

said maximum level and said minimum level *(2nd electrical input "1" as shown in fig 12D, result*

in a minimum level of optical output "intensity 0" as shown in fig 12F), and optical phase

relating to said maximum level of said optical signal is opposite of optical phase relating to said

minimum level of said optical signal *(fig 12F shows "π" and "0" as the respective phase, which*

are opposite).

Response to Arguments

10.   Applicant's arguments filed 9/21/2006 have been fully considered but they are not

persuasive.

Applicant argues that "the Examiner has not demonstrated how Yonenaga '952 could

describe, teach, or suggest the [amended] features set forth in claim 1". Citations to Yonenaga

'952 that reads on the amended limitations in claim 1 has been demonstrated in 103 rejection

above, and duplicated as follow:

Yonenaga further teaches wherein said electrical-optical conversion means has a

traveling wave type electrode *(70, fig 1B)* designed so that phase change of optical wave

propagating in optical waveguide depending upon electrical field has waveforms of a ternary

duobinary signal *(fig 12F)*.

Furthermore, applicant's amended claims 1, 10, 13, 16-18 does not read on any of the

drawings correspond to any of the embodiments as originally filed. Accordingly, 112 1st

paragraph rejection is used.

Furthermore, the indicated allowability of claims 10-12, 17, 18, and 20-22 is withdrawn

after further review of the reference(s) to Yonenaga et al. *(US005543952A)* and Burns et al.

(US005644664A).

Allowable Subject Matter

11.   Claims 19 and 23 are allowed.

Conclusion

12.   The prior art made of record in previous actions and not relied upon is considered

pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Danny Wai Lun Leung whose telephone number is (571) 272-5504. The examiner can normally be reached on 9:30am-9:00pm Mon-Thur.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DWL
December 6, 2006

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